TETRA TECH

March 30, 2011

Mr. Roy Crossland
START Project Officer
U.S. Environmental Protection Agency, Region 7
901 North 5th Street
Kansas City, Kansas 66101

Subject: Vapor Intrusion Assessment
Cozad Groundwater Site, Cozad, Nebraska
CERCLIS ID: NEN000705851
U.S. EPA Region 7 START 3, Contract No. EP-S7-06-01, Task Order No. 0002.059.001
Task Monitor: Brian Mitchell, EPA Site Assessment Manager

Dear Mr. Crossland:

Tetra Tech EM Inc. is submitting the enclosed revised Vapor Intrusion Assessment report for the above-referenced site. This report has been revised based on comments received from EPA on March 16, 2011, and supersedes the previous report dated March 8, 2011. The appendices submitted with the previous report may be attached to this revised text, except for Figure 5 in Appendix A, which should be replaced with the included edited version. If you have any questions or comments regarding this submittal, please contact the project manager at (913) 707-1459.

Sincerely,

for Laura Moore, RG, CHMM
START Project Manager

Ted Faile, PG, CHMM
START Program Manager

Enclosures

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VAPOR INTRUSION ASSESSMENT
COZAD GROUNDWATER SITE
COZAD, NEBRASKA
CERCLIS ID: NEN000705851

Superfund Technical Assessment and Response Team (START) 3

Contract No. EP-S7-06-01, Task Order No. 0002.059.001

Prepared For:

U.S. Environmental Protection Agency
Region 7
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March 30, 2011

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1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division, under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), tasked Tetra Tech EM, Inc., (Tetra Tech) to conduct a vapor intrusion assessment (VIA) of the Cozad Groundwater site in Cozad, Dawson County, Nebraska, under Superfund Technical Assessment and Response Team (START) 3 Contract Number EP-S7-06-01, Task Order Number 0002.059.001.

This VIA was conducted in accordance with *Draft Guidance for Evaluating Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (EPA 2002). The purpose of this VIA was to determine if tetrachloroethylene (PCE) and trichloroethylene (TCE) contamination in groundwater may present a threat to human health via indoor vapor intrusion into residences and workplaces. The scope of the VIA included a review of information provided by EPA and the Nebraska Department of Environmental Quality (NDEQ), a compilation and evaluation of potential targets, and a sampling investigation.

The Cozad Groundwater site was entered into the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) on July 17, 2006 (NEN000705851) (EPA 2010a). An associated site, Nebraska Plastics, was entered into CERCLIS on February 20, 2008 (NEN000705428) (EPA 2010b).

2.0 SITE DESCRIPTION

The site's location and features and relevant previous investigations in the Cozad area are discussed below.

2.1 SITE LOCATION

Cozad is located in west-central Dawson County, in south-central Nebraska. The town lies in the Middle Platte drainage basin, on the northern bank of the Platte River. The site is roughly bounded by the following geographic coordinates: 40.8625º north latitude and 99.9957º west longitude (northwest corner); 40.8625º north latitude and 99.9714º west longitude (northeast corner); 40.8500º north latitude and 99.9957º west longitude (southwest corner); and 40.8500º north latitude and 99.9714º west longitude (southeast corner). These coordinates roughly correspond to the area between 11th Street and Interstate 80 (north to south), and between Locust Street and Dawson County Drainage Ditch No. 4 (east to west). This area includes a Union Pacific Railroad track, a Tenneco Automotive (Tenneco) facility, and two former Hunt Cleaners facilities at 600 West U.S. Highway 30 and 710 Meridian Avenue. The area also includes

(active and abandoned) municipal wells 53-1, 59-1, 64-1, 65-1, 67-1, 67-2, 72-1, 94-1, 2006-01, and 2006-02 (see Appendix A, Figure 1). Of these wells, 59-1 is known to be contaminated with PCE, and TCE has been detected in other municipal wells in the past.

2.2 SITE FEATURES

The site includes a contaminated public water supply well (59-1) for the City of Cozad, Nebraska. Cozad is a small farming and manufacturing town with a population of about 4,100. The town was founded in 1872, when a branch of the Union Pacific Railroad reached the area. The town now supports a mix of agricultural businesses, light industry, and heavy manufacturing. Starting in the mid-1980s, samples collected from municipal well 59-1 have contained the chlorinated volatile organic compound (VOC) PCE at concentrations that exceed the EPA's maximum contaminant level (MCL) of 5.0 micrograms per liter (μg/L) (Tetra Tech 2007).

Soils at the site are Gosper silt loam having 0- to 2-percent slopes. These are nearly level, saline to alkaline soils that form on stream terraces in the Platte River Valley (U.S. Department of Agriculture [USDA] 1978). The annual precipitation for Dawson County is about 21.6 inches, with about 80 percent falling in April through September. The average seasonal snowfall is 28 inches (USDA 1978).

The bedrock underlying the area of the site is the Tertiary Ogallala Formation. The Ogallala consists of complex deposits of sand, silt, clay, and gravel interbedded with lime- or silica-cemented sandstone. Thicknesses of individual layers differ significantly over short lateral and vertical distances. Groundwater flow at the site is assumed to follow the regional flow, generally east-southeastward towards and with the Platte River (University of Nebraska – Lincoln [UNL] 1980, 1998). According to well logs for registered wells in the area, the overburden thickness is approximately 5 to 17 feet and is composed primarily of clay, which overlies interbedded clay, sand, gravel, and sandstone. Depth to groundwater is 5 to 24 feet below ground surface (bgs) (Nebraska Department of Natural Resources [NDNR] 2010).

The Cozad public water system (PWS) serves about 4,100 persons through six active wells. The leading well for pumping on any given day is alternated among wells 85-1, 94-1, 2006-01, and 2006-02. However, well 85-1 may be pumped slightly more than the other wells (Tetra Tech 2008). Wells 63-1 and 65-1 are also pumped during times of peak demand, such as the summer months (Tetra Tech 2008). Well 53-1, which had functioned as a surplus capacity source for fire suppression or other emergency needs (Tetra Tech 2005), was plugged in September 2007 (Tetra Tech 2008). Well 59-1, formerly listed as a standby well, was abandoned in 2006 because of elevated arsenic concentrations (Tetra Tech 2007). Well 85-1,

northwest of town, was installed to replace wells 64-1 and 72-1, which had been removed from service because of TCE contamination from the Tenneco site. Three other wells (66-1, 67-1, and 67-2) were also reportedly removed from service because of contamination from Tenneco. Wells 67-1 and 67-2 were located east (downgradient) of the Tenneco facility; however, well 66-1 was located near the municipal airport northwest (upgradient) of Tenneco. Well 94-1, located east of town, was added to replace these wells (Tetra Tech 2005). Groundwater sampling results for well 59-1 from 1987 through 2005 indicated the presence of PCE at concentrations between 0.67 and 7.9 µg/L. Municipal well information is provided in Table 1, and well locations are shown on Figure 1 in Appendix A.

TABLE 1

COZAD, NEBRASKA, PUBLIC WATER SUPPLY WELLS
COZAD GROUNDWATER SITE, COZAD, NEBRASKA

Well Number	Well Registration Number	Well Depth (feet bgs)	Screened Interval (feet bgs)	Static Water Level (feet bgs)	Pumping Rate (gpm)	Remarks
Active Wells						
63-1	G-074086	267	222 - 267	8	800	Peak demand only
65-1	G-074087	370	340 - 370	Unknown	1,000	Peak demand only
85-1	G-069999	380	228 - 380	7	2,000	Slightly predominant
94-1	G-083024	405	288 - 403	10	900	
2006-01	G-074082R	433	340 - 380 405 - 430	15	1,100	
2006-02	G-074082	425	280 - 370 400 - 420	13	1,100	
Abandoned Wells						
53-1	G-074082	192	172 - 192	Unknown	700	Shallow well; abandoned for new well
59-1	G-074090	240	200 - 240	Unknown	700	Abandoned due to high arsenic
64-1	Unknown	312	264 - 312	Unknown	Unknown	Abandoned due to VOCs
66-1	Unknown	405	Unknown	Unknown	Unknown	Abandoned due to VOCs
67-1	Unknown	200	180 - 200	Unknown	Unknown	Abandoned due to VOCs
67-2	Unknown	40	30 - 40	Unknown	Unknown	Abandoned due to VOCs
72-1	Unknown	420	350 - 420	Unknown	Unknown	Abandoned due to VOCs

Notes:

The well number includes the year in which it was drilled (e.g., "63-1" indicates the well was drilled in 1963; "2006-01" indicates the well was drilled in 2006).

bgs Below ground surface
gpm Gallons per minute
VOC Volatile organic compound

2.3 REGULATORY INVOLVEMENT

The following is a summary of prior regulatory involvement at the site.

2.3.1 Nebraska Department of Environmental Quality

NDEQ has conducted several investigations of contamination identified in the Cozad PWS. The Nebraska Plastics facility was evaluated as a potential contaminant source for the Cozad PWS in a Preliminary Assessment (PA) and Site Inspection (SI) conducted in December 2004 and March 2005 by Tetra Tech under contract to NDEQ (Tetra Tech 2005). Additional investigation of the Cozad PWS site was conducted in 2007 (Tetra Tech 2007). Other potential sources evaluated in the Cozad PWS investigations included Tenneco and the two former Hunt Cleaners dry cleaning facilities.

The Tenneco (formerly Monroe Automotive Equipment) facility is located at 121 Meridian Avenue (see Appendix A, Figure 1). Tenneco has been the subject of ongoing environmental investigations since 1984 and is under Resource Conservation and Recovery Act (RCRA) enforcement action (EPA 2008). The site is the source of a TCE plume that underlies much of Cozad and has resulted in the closure of a number of Cozad PWS wells. PCE has been detected in Tenneco monitoring wells, including on-site wells. Because groundwater is being drawn toward Tenneco's high-volume extraction wells at the facility from all directions, the PCE in on-site Tenneco wells could have originated off site (Tetra Tech 2007).

Hunt Cleaners is an industrial dry cleaner currently located at 604 West 2nd Street (see Appendix A, Figure 1). From about 1985 until March 2004, when it was destroyed by a fire, Hunt Cleaners was located at 600 West U.S. Highway 30. Hunt Cleaners also had operated at 710 Meridian Avenue from about 1954 to 1986. That location is about 0.4 mile further southeast, downgradient of the Highway 30 site. Hunt used PCE in its cleaning processes prior to 1988, when it switched to using Stoddard solvent (Tetra Tech 2007).

A Phase II environmental site assessment (ESA) was conducted by Milco Environmental Services (Milco) at the former Hunt Cleaners site at 600 West U.S. Highway 30 after the 2004 fire. The Phase II ESA report indicated that this location had been a farm implement dealership prior to use by Hunt Cleaners. The investigation found high concentrations of PCE and other VOCs, including free petroleum product, in shallow groundwater on the property. The Phase II ESA also found hydrocarbons and waste oil in soil samples collected at less than 5 feet bgs, with a maximum of 56,000 milligrams per kilogram (mg/kg) of waste oil and 7,000 mg/kg purgeable hydrocarbons detected in the samples. Five monitoring wells (MW) were installed on the property. Light non-aqueous phase liquid (LNAPL) was detected in two of the wells

(MW-2 and MW-3), with a maximum LNAPL thickness of 0.59 feet. VOCs, including PCE, were detected in groundwater samples collected from about 15 feet bgs in wells MW-2, MW-3, and MW 5 (see Table 2) (Tetra Tech 2007). NDNR database records for registered wells indicate that wells MW-2 and MW-3 are located in the general building area, while MW-5 is to the southeast (NDNR 2010).

TABLE 2

GROUNDWATER RESULTS FOR FORMER HUNT CLEANERS SITE (AUGUST 2004)
COZAD GROUNDWATER SITE, COZAD, NEBRASKA

Compound	MCL (µg/L)	MW-2 (µg/L)	MW-3 (µg/L)	MW-5 (µg/L)
Ethyl benzene	700	**7,068**	**26,700**	Not detected
Tetrachloroethene	5	**1,280**	**6,100**	**7**
Toluene	1,000	**42,293**	**127,500**	Not detected
Trichloroethene	5	**284**	**1,500**	Not detected
Xylenes, total	10,000	**47,378**	**157,200**	Not detected

Notes:

Bold font indicates the concentration exceeds the MCL.

MCL Maximum contaminant level
µg/L Micrograms per liter

In April and June 2005, Milco conducted a followup investigation, installing an additional six monitoring wells on and around the former Hunt Cleaners facility. Five of the six new wells and four of the original five wells were sampled in April 2005; wells MW-3 and MW-7 were not sampled because of the presence of free petroleum product in the wells. MW-7 was installed northeast of MW-5 on the eastern (downgradient) property line. As a result of the free product found in MW-7, four additional monitoring wells were installed and sampled in June 2005. PCE was detected in groundwater collected from wells MW-2 (32 µg/L), MW-5 (2 µg/L), and MW-6 (6 µg/L); however, PCE was not detected in off-site downgradient wells (Tetra Tech 2007). NDNR records indicate that wells MW-6, MW-7, and MW-8 are located generally east (downgradient) of the former Hunt Cleaners building (NDNR 2010).

Table 3 shows locations and depths of soil samples collected during the Milco investigation of the Hunt facility that contained detectable concentrations of PCE. Concentrations of PCE exceeded the NDEQ Residential Remediation Goal and Migration to Groundwater Goal in the soil samples collected from borings at MW-7 and MW-8. NDNR records indicate the location of SB-1 was near the east side of the former building, just southwest of MW-3, and the location of MW-10 was generally north of the former Hunt Cleaners building (NDNR 2010).

TABLE 3

SOIL RESULTS FOR FORMER HUNT CLEANERS SITE (APRIL 2005)
COZAD GROUNDWATER SITE, COZAD, NEBRASKA

Soil Sample Location Description	Depth (ft bgs)	Tetrachloroethene (mg/kg)
SB-1 (east of building)	1 - 3	0.016
SB-1 (east of building)	3 - 5	0.049
MW-7 (east property line)	7 - 9	**2.173**
MW-8 (north of MW-7)	7 - 9	**1.753**
MW-10 (north of building)	1 - 3	0.003
NDEQ Industrial Remediation Goal		15
NDEQ Residential Remediation Goal		0.6
NDEQ Migration to Groundwater Remediation Goal		0.058

Notes:

Bold font indicates concentration exceeds an NDEQ voluntary cleanup standard.
Soil cleanup levels are taken from the NDEQ voluntary cleanup program guidance (NDEQ 2005).

ft bgs Feet below ground surface
mg/kg Milligrams per kilogram
NDEQ Nebraska Department of Environmental Quality

The NDNR registered wells database indicates that 12 monitoring wells ranging from 13.5 to 15 feet deep are currently registered for the Hunt Cleaners facility. In addition, two 25-foot-deep recovery wells and an 8-foot-deep soil vapor extraction well are registered at the site. The NDNR database also indicates that 150 other monitoring wells are located within 1 mile of the Nebraska Plastics facility. Of these, 134 are associated with the Tenneco/Monroe site, and 16 are associated with a leaking underground storage tank site at a grain elevator about 0.5 mile southeast of Nebraska Plastics (NDNR 2010).

The NDEQ PA/SI of the Cozad PWS site was conducted in two stages. In December 2004, groundwater samples were collected at 50 feet bgs and at the depth of refusal (ranging from 63 to 110 feet bgs) from nine temporary direct-push technology (DPT) wells around Cozad. VOCs were detected in only one of those groundwater samples. This sample was collected at 50 feet bgs downgradient of the Tenneco facility; no PCE was identified in this sample (Tetra Tech 2005).

In March 2005, groundwater samples were collected from DPT temporary wells at 23 locations, generally along suspected migration pathways from potential source areas to municipal well 59-1. Samples were collected at depths of 10 to 20 feet bgs. No PCE was identified in those samples. During the March 2005 sampling event, one soil sample was found to contain PCE. The sample was collected from the northeastern corner of Avenue M and West U.S. Highway 30. This sample—CPWS-23-SL—contained

7.9 micrograms per kilogram of PCE and was collected from a depth of about 0.5 feet bgs. Four other soil samples were collected on the public right-of-ways around the Hunt Cleaners (600 West U.S. Highway 30) property; however, none contained detectable concentrations of PCE (Tetra Tech 2005).

In January 2007, NDEQ conducted a second site investigation. As part of this investigation, 31 groundwater samples were collected from nine locations on and around the former Hunt Cleaners facility at 710 Meridian Avenue and near well 59-1. PCE was reported by an on-site mobile laboratory at a concentration of 16 µg/L in sample TW-1-10, and at 5 µg/L in TW-2-10. These samples were both collected from 10 feet bgs near the back door of the former 710 Meridian Avenue Hunt Cleaners facility (Tetra Tech 2007).

2.3.2 U.S. Environmental Protection Agency

In February 2008, EPA completed a Pre-CERCLIS Screening Site Assessment (SSA) Report for groundwater in the Cozad area, which concluded that a PA should be performed at the Nebraska Plastics site (EPA 2008). No release from the Nebraska Plastics facility was established during the August 2008 PA (Tetra Tech 2008).

In August 2008, EPA completed a PA for the Nebraska Plastics site. The PA activities included collection of groundwater samples from one City of Cozad PWS well (65-1), 15 private wells, and five on-site temporary wells. One additional temporary well was sampled for background concentrations northwest of the facility, in an alfalfa field on airport property. Based on the results of the PA, no release of contamination associated with the Nebraska Plastics facility was established (Tetra Tech 2008).

3.0 INVESTIGATIVE EFFORTS

Section 3.0 discusses the field sampling and associated quality assurance (QA)/quality control (QC) activities performed at the site for the VIA. The general objective of the VIA was to determine whether any threats to human health exist via indoor vapor intrusion into residences and workplaces. A site-specific Quality Assurance Project Plan (QAPP) in support of VIA activities was approved by EPA on December 6, 2010, prior to conducting the VIA sampling. Field activities were conducted in accordance with the approved QAPP, except where noted. START Team Members (STM) Laura Moore and Greg Dillon conducted air and sub-slab soil gas sampling activities January 6 through 11, 2011, and STM Quan Do assisted with direct-push sampling activities for collection of exterior soil gas samples January 6 through 7, 2011. Field activities included collection of seven indoor air samples (including a background sample), one ambient air sample, and 14 soil gas samples (six sub-slab, and eight from exterior yards).

Photographs documenting site activities are included in Appendix B. Sampling-related activities were recorded in a site logbook, a copy of which is included in Appendix C. Samples for analytical services request (ASR) 5193 were delivered to the EPA Region 7 laboratory on January 10, 11, and 12, 2011. Field sheets and chain-of-custody records are included as Appendix D.

3.1 INDOOR AND AMBIENT AIR SAMPLING

Indoor air samples were collected from residences and businesses (including one indoor background location) in the site area (at or adjacent to the former Hunt Cleaners facilities at 600 West U.S. Highway 30 and 710 Meridian Avenue [now First United Methodist Church thrift store], and at the Tenneco facility). The samples were collected from indoor living areas or active business spaces at each location. For the indoor air sampling, Summa canisters were fitted with passive flow regulating devices to enable collection of air samples for a continuous 24-hour period. All Summa sampling was conducted in accordance with EPA Environmental Response Team Standard Operating Procedure (SOP) 4231.1704 – Summa Canister Sampling. In addition to the indoor air samples, one sample was collected from an outside (ambient air) location, over a 24-hour period. The air samples were submitted to the EPA Region 7 laboratory for analysis of VOCs. Table 4 summarizes the air sample locations, which are also shown on Figure 2 in Appendix A.

TABLE 4

INDOOR AND AMBIENT AIR SAMPLE LOCATIONS
COZAD GROUNDWATER SITE, COZAD, NEBRASKA

Location ID	Sample No.	Sample Address	Sample Location	Sample Type
CIA-1	5193-1	121 Meridian Avenue – Tenneco facility	Former TCE tank location	Indoor air
CIA-2	5193-2	121 Meridian Avenue – Tenneco facility	Assembly Manager's office	Indoor air
CIA-3	5193-3	121 Meridian Avenue – Tenneco facility	Former degreaser location	Indoor air
CIA-4	5193-4	901 L Street – Cozad Housing Authority apartments	South meter panel room	Indoor air
CIA-5	5193-5	901 L Street – Cozad Housing Authority apartments	Living room in Apartment 1	Indoor air
CAA-1	5193-6	901 L Street – Cozad Housing Authority apartments	West of apartments	Outside – ambient air
CIA-6	5193-7	706 Meridian Avenue – Residence	Basement	Indoor air
CIA-7	5193-8	122 E. 7th Street – Cozad Telephone Co.	Office	Indoor air

Notes: ID Identification TCE Trichloroethylene

3.2 SUB-SLAB SOIL GAS SAMPLING

For each sub-slab soil gas sample, a hole was drilled through the concrete basement floor or other accessible portion of the foundation with a rotary hammer drill and concrete bit. A stainless steel rod was then connected to disposable 0.25-inch-diameter polyethylene tubing and lowered into the hole. The annulus around the stainless steel rod was sealed with cement grout, and then a Swagelok® fitting was attached to the top of the tubing to allow connection to an evacuated Summa canister. The Summa canister was fitted with a flow regulator to enable collection of sub-slab vapors over a continuous 24-hour period. The sub-slab soil gas samples were submitted to the EPA Region 7 laboratory for analysis of VOCs. Table 5 summarizes the sub-slab soil gas sample locations, which are also shown on Figure 2 in Appendix A.

TABLE 5

SUB-SLAB SOIL GAS SAMPLE LOCATIONS
COZAD GROUNDWATER SITE, COZAD, NEBRASKA

Location ID	Sample No.	Sample Address	Sample Location
CSS-1	5193-110	121 Meridian Avenue – Tenneco facility	Former TCE tank location
CSS-2	5193-111	121 Meridian Avenue – Tenneco facility	Near former TCE transfer pipe
CSS-3	5193-112	121 Meridian Avenue – Tenneco facility	Former degreaser location
CSS-4	5193-113	901 L Street – Cozad Housing Authority apartments	South garbage room
CSS-5	5193-114	901 L Street – Cozad Housing Authority apartments	North garbage room
CSS-6	5193-115	706 Meridian Avenue – Residence	Basement

Notes:

ID Identification
TCE Trichloroethylene

3.3 EXTERIOR SOIL GAS SAMPLING

Soil gas samples were collected at eight locations from yards at the site (see Appendix A, Figure 2). Each soil gas sample was collected by driving Geoprobe® steel rods to the desired sampling depth of 7 feet bgs, inserting disposable polyethylene tubing into the rod string, and securing the tubing to the bottom of the rods with an airtight fitting. The other (surface) end of the tubing was attached to a vacuum pump, which was used to purge the tubing of about 2 to 5 liters of ambient air. Then the tubing was clamped, disconnected from the vacuum pump, and connected to an evacuated Summa canister. The tubing was

unclamped, a valve on the Summa canister was opened, and the canister was allowed to fill with soil gas vapors. The exterior soil gas samples were submitted to the EPA Region 7 laboratory for analysis of VOCs. Table 6 summarizes the soil gas sample locations, which are also shown on Figure 2 in Appendix A.

TABLE 6

EXTERIOR SOIL GAS SAMPLE LOCATIONS
COZAD GROUNDWATER SITE, COZAD, NEBRASKA

Location ID	Sample No.	Sample Location	Latitude/Longitude
CSG-1	5193-101	121 Meridian Avenue – Tenneco facility	40.85270°N, 99.98705°W
CSG-2	5193-102	121 Meridian Avenue – Tenneco facility	40.85405°N, 99.98732°W
CSG-3	5193-103	121 Meridian Avenue – Tenneco facility	40.85371°N, 99.98975°W
CSG-4	5193-104	710 Meridian Avenue area	40.85857°N, 99.98536°W
CSG-5	5193-105	710 Meridian Avenue area	40.85845°N, 99.98534°W
CSG-6	5193-106	901 L Street – Cozad Housing Authority apartments	40.86003°N, 99.99139°W
CSG-7	5193-107	901 L Street – Cozad Housing Authority apartments	40.86092°N, 99.99194°W
CSG-8	5193-108	Avenue O – Muny Park – background location	40.86545°N, 99.99591°W

Notes:

ID	Identification
N	North
TCE	Trichloroethylene
W	West
°	Degrees

4.0 ANALYTICAL DATA SUMMARY

Section 4.0 summarizes the analytical data for the indoor and ambient air, sub-slab soil gas, and exterior soil gas samples collected during the January 2011 VIA. The complete analytical data are included as Appendix E.

4.1 INDOOR AND AMBIENT AIR ANALYTICAL DATA SUMMARY

The ambient air sample (CAA-1) contained reportable concentrations of benzene (2.2 micrograms per cubic meter [µg/m^3]), toluene (10.2 µg/m^3), and m- and/or p-xylene (4.4 µg/m^3). No concentrations in the ambient air sample exceeded their respective EPA Regional Screening Levels (RSL) (EPA 2010c).

Tenneco Facility

Three indoor air samples were collected at the Tenneco facility (CIA-1, CIA-2, and CIA-3). Toluene was detected in sample CIA-3 at a concentration of 4.5 µg/m^3, below its RSL of 22,000 µg/m^3 (industrial air) and Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) of 754,000 µg/m^3. No other VOCs were detected in the indoor air samples collected at the Tenneco facility. The analytical results for the air samples are summarized in Table 7 and shown on Figure 3 in Appendix A.

600 West Highway 30 Area - 901 L Street

Two indoor air samples, CIA-4 and CIA-5, were collected at an apartment building located east of 600 West Highway 30. Both samples had reportable concentrations of toluene (10 and 13.4 µg/m^3); however, both concentrations were below its RSL of 5,200 µg/m^3 (residential air). One sample, CIA-4, also contained reportable concentrations of benzene (2.7 µg/m^3) and m- and/or p-xylene (5.1 µg/m^3). The benzene concentration exceeded its RSL for residential air (0.31 µg/m^3); however, the ambient air sample collected outside the apartment building contained benzene at 2.2 µg/m^3. Therefore, this indoor air concentration may not be the result of vapor intrusion. The analytical results are summarized in Table 7 and shown on Figure 4 in Appendix A.

710 Meridian Avenue Area - 706 Meridian Avenue & 122 E. 7th Street

Benzene was detected at concentrations exceeding its RSLs (0.31 µg/m^3 for residential air, and 1.6 µg/m^3 for industrial air) but below its PEL (3,190 µg/m^3) in the two indoor air samples collected at these locations (3.2 µg/m^3 in sample CIA-6 [residence], and 26.1 µg/m^3 in sample CIA-7 [workplace]). Sample CIA-7 also contained ethyl benzene at 9.5 µg/m^3, exceeding its RSL of 4.9 µg/m^3 (industrial air),

but below its PEL of 435,000 µg/m^3. Reportable concentrations of toluene (14.8 and 63.7 µg/m^3) and m- and/or p-xylene (5.2 and 32.5 µg/m^3) were also found in both samples, below their respective RSLs and PELs. Also, 1,1,1-trichloroethane (TCA) was detected in CIA-6 (2.9 µg/m^3), below its RSL of 5,200 µg/m^3. The analytical results are summarized in Table 7 and shown on Figure 5 in Appendix A.

TABLE 7

ANALYTICAL DATA SUMMARY FOR INDOOR AND AMBIENT AIR SAMPLES
COZAD GROUNDWATER SITE, COZAD, NEBRASKA

Location ID	Sample No.	Starting Sample Date and Time	Ending Sample Date and Time	Benzene	Ethyl Benzene	Toluene	1,1,1-TCA	m- and/or p-Xylene	o-Xylene
				Concentration (µg/m^3)					
CIA-1	5193-1	1/8/11; 10:35	1/9/11; 08:09	1.6 U	2.2 U	1.9 U	2.7 U	4.3 U	2.2 U
CIA-2	5193-2	1/8/11; 10:45	1/9/11; 09:42	1.6 U	2.2 U	1.9 U	2.7 U	4.3 U	2.2 U
CIA-3	5193-3	1/8/11; 10:38	1/9/11; 10:38	1.6 U	2.2 U	4.5	2.7 U	4.3 U	2.2 U
CIA-4	5193-4	1/8/11; 18:25	1/9/11; 12:53	**2.7**	2.2 U	13.4	2.7 U	5.1	2.2 U
CIA-5	5193-5	1/8/11; 18:45	1/9/11; 12:57	1.6 U	2.2 U	10	2.7 U	4.3 U	2.2 U
CAA-1	5193-6	1/8/11; 18:53	1/9/11; 12:46	**2.2**	2.2 U	10.2	2.7 U	4.4	2.2 U
CIA-6	5193-7	1/9/11; 11:26	1/10/11; 10:00	**3.2**	2.2 U	14.8	2.9	5.2	2.2 U
CIA-7	5193-8	1/10/11; 10:09	1/11/11; 08:30	**26.1**	**9.5**	63.7	2.7 U	32.5	10.9
Regional Screening Level (residential air)				0.31	0.97	5,200	5,200	730	730
Regional Screening Level (industrial air)				1.6	4.9	22,000	22,000	3,100	3,100
OSHA Permissible Exposure Limit (OSHA 2011)				3,190	435,000	754,000	1,900,000	435,000	435,000

Notes:

Bold values exceeded an EPA Regional Screening Level.

EPA U.S. Environmental Protection Agency
ID Identification
OSHA Occupational Safety and Health Administration
TCA Trichloroethane
U Not detected at or above the reporting limit
µg/m^3 Micrograms per cubic meter

4.2 SUB-SLAB SOIL GAS ANALYTICAL DATA SUMMARY

Tenneco Facility

Numerous VOCs were detected in the three sub-slab samples collected at the Tenneco facility (CSS-1, CSS-2, and CSS-3). Benzene (up to 7.9 µg/m^3), ethyl benzene (up to 7.9 µg/m^3), toluene (up to 48.4 µg/m^3), TCE (up to 2,480 µg/m^3), m- and/or p-xylene (up to 314 µg/m^3), and o-xylene (up to 88.5 µg/m^3) were detected in all three samples. PCE was detected in two samples, at up to 61.6 µg/m^3. Chloroethane (3.4 µg/m^3); 1,1-dichloroethane (DCA) (681 µg/m^3); 1,2-DCA (187 µg/m^3); 1,1-dichloroethene (DCE) (7.6 µg/m^3); *cis*-1,2-DCE (1,270 µg/m^3); *trans*-1,2-DCE (29.4 µg/m^3); and 1,1,1-TCA (1,270 µg/m^3) were detected in one sample (CSS-1). The analytical results are summarized in Table 8 and shown on Figure 3 in Appendix A.

600 West Highway 30 Area - 901 L Street

Ethyl benzene (6.2 and 3.6 µg/m^3), toluene (20.5 and 12 µg/m^3), m- and/or p-xylene (25.2 and 16.4 µg/m^3), and o-xylene (8.6 and 4.9 µg/m^3) were detected in the two samples collected at this location (CSS-4 and CSS-5). In addition, benzene was detected in one sample (CSS-4 at 2.7 µg/m^3). The analytical results are summarized in Table 8 and shown on Figure 4 in Appendix A.

710 Meridian Avenue Area - 122 E. 7th Street

Benzene (1.9 µg/m^3), ethyl benzene (5.9 µg/m^3), toluene (23.1 µg/m^3), m- and/or p-xylene (25.9 µg/m^3), and o-xylene (8.3 µg/m^3) were detected in sample CSS-6. The analytical results are summarized in Table 8 and shown on Figure 5 in Appendix A.

TABLE 8

ANALYTICAL DATA SUMMARY FOR SUB-SLAB SOIL GAS SAMPLES
COZAD GROUNDWATER SITE, COZAD, NEBRASKA

Location ID	Sample No.	Starting Sample Date and Time	Ending Sample Date and Time	Benzene	Chloroethane	1,1-DCA	1,2-DCA	1,1-DCE	*cis*-1,2-DCE	*trans*-1,2-DCE	Ethyl Benzene	PCE	Toluene	1,1,1-TCA	TCE	m- and/or p-Xylene	o-Xylene
				Concentration (µg/m^3)													
CSS-1	5193-110	1/8/11; 10:01	1/9/11; 08:09	7.9	3.4	681	187	7.6	1,270	29.4	12.9	61.6	37	1,270	2,480	47.5	17.1
CSS-2	5193-111	1/8/11; 10:12	1/9/11; 08:10	3.7	1.3 U	2 U	2 U	2 U	2 U	2 U	23.2	4.4	48.4	2.7 U	16.3	62.6	19
CSS-3	5193-112	1/8/11; 10:20	1/9/11; 08:14	4.1	1.3 U	2 U	2 U	2 U	2.4	2 U	182	3.4 U	33.4	2.7 U	217	314	88.5
CSS-4	5193-113	1/8/11; 18:24	1/9/11; 12:51	2.7	1.3 U	2 U	2 U	2 U	2 U	2 U	6.2	3.4 U	20.5	2.7 U	2.7 U	25.2	8.6
CSS-5	5193-114	1/8/11; 18:37	1/9/11; 12:57	1.6 U	1.3 U	2 U	2 U	2 U	2 U	2 U	3.6	3.4 U	12	2.7 U	2.7 U	16.4	4.9
CSS-6	5193-115	1/9/11; 11:26	1/10/11; 11:27	1.9	1.3 U	2 U	2 U	2 U	2 U	2 U	5.9	3.4 U	23.1	2.7 U	2.7 U	25.9	8.3

Notes:

DCA Dichloroethane
DCE Dichloroethylene
ID Identification
PCE Tetrachloroethylene
TCA Trichloroethane
TCE Trichloroethylene
U Not detected at or above the reporting limit
µg/m^3 Micrograms per cubic meter

4.3 EXTERIOR SOIL GAS ANALYTICAL DATA SUMMARY

No VOC were detected in the background soil gas sample (CSG-8).

Tenneco Facility

TCE and toluene were detected in all three samples collected at this location (CSG-1, CSG-2, and CSG-3). TCE concentrations ranged from 6.9 to 23.5 µg/m^3, and toluene ranged from 2.2 to 4.9 µg/m^3. Also, 1,1,1-TCA was detected in CSG-1 at 3.9 µg/m^3, PCE was detected in CSG-2 at 16.3 µg/m^3, and benzene was detected in CSG-3 at 2.4 µg/m^3. The analytical results are summarized in Table 9 and shown on Figure 3 in Appendix A.

600 West Highway 30 Area - 901 L Street

One of the two samples collected at this location (CSG-6 and CSG-7) contained VOCs. Sample CSG-6 contained benzene at 1.8 µg/m^3, PCE at 7.3 µg/m^3, and toluene at 10.4 µg/m^3. The analytical results are summarized in Table 9 and shown on Figure 4 in Appendix A.

710 Meridian Avenue Area

Both samples collected at this location (CSG-4 and CSG-5) contained PCE (2,160 µg/m^3 and 125 µg/m^3) and TCE (10.5 µg/m^3 and 5.3 µg/m^3). In addition, toluene was detected in CSG-5 at 1.9 µg/m^3. The analytical results are summarized in Table 9 and shown on Figure 5 in Appendix A.

TABLE 9

ANALYTICAL DATA SUMMARY FOR EXTERIOR SOIL GAS SAMPLES
COZAD GROUNDWATER SITE, COZAD, NEBRASKA

Location ID	Sample No.	Starting Sample Date and Time	Ending Sample Date and Time	Benzene	PCE	Toluene	TCE	1,1,1-TCA
				Concentration (µg/m^3)				
CSG-1	5193-101	1/7/11; 08:40	1/7/2011; 08:43	1.6 U	3.4 U	2.2	6.9	3.9
CSG-2	5193-102	1/7/11; 09:40	1/7/11; 09:43	1.6 U	16.3	2.2	23.5	2.7 U
CSG-3	5193-103	1/7/11; 10:00	1/7/11; 10:03	2.4	3.4 U	4.9	11.6	2.7 U
CSG-4	5193-104	1/7/11; 10:25	1/7/11; 10:28	1.6 U	2,160	1.9 U	10.5	2.7 U
CSG-5	5193-105	1/7/11; 10:53	1/7/11; 10:54	1.6 U	125	1.9	5.3	2.7 U
CSG-6	5193-106	1/7/11; 11:15	1/7/11; 11:16	1.8	7.3	10.4	2.7 U	2.7 U
CSG-7	5193-107	1/7/11; 11:28	1/7/11; 11:29	1.6 U	3.4 U	1.9 U	2.7 U	2.7 U
CSG-8	5193-108	1/7/11; 11:46	1/7/11; 11:47	1.6 U	3.4 U	1.9 U	2.7 U	2.7 U

Notes:

ID Identification
PCE Tetrachloroethylene
TCA Trichloroethane
TCE Trichloroethylene
U Not detected at or above the reporting limit
µg/m^3 Micrograms per cubic meter

5.0 DEVIATIONS FROM THE QUALITY ASSURANCE PROJECT PLAN

To ensure the credibility of sample collection, preparation procedures, and analytical data, QA/QC sampling for the project was conducted according to protocols approved by EPA Region 7 for work at hazardous waste sites, in accordance with the QAPP (Tetra Tech 2010). Tetra Tech START performed all work on this project in accordance with the site-specific QAPP, with the following exceptions:

- Instead of nine indoor air samples proposed in the QAPP, only seven indoor samples were collected for laboratory analysis.
- Six sub-slab soil gas samples were collected instead of nine, as specified in the QAPP.
- Eight exterior soil gas samples were collected instead of 10, as specified in the QAPP.

Locations not sampled as planned were due to lack of access granted by the property owners.

6.0 SUMMARY AND CONCLUSIONS

Tetra Tech START conducted VIA sampling at the Cozad Groundwater site in Cozad, Nebraska, from January 6 to 11, 2011. During the VIA, sampling of indoor air, ambient air, sub-slab soil gas, and soil gas from yards was conducted to determine if any threats were posed to occupants of nearby residences and businesses as a result of indoor vapor intrusion.

Tenneco Facility

Toluene was detected in one indoor air sample at a concentration of 4.5 µg/m^3, below its RSL (22,000 µg/m^3 for industrial air) and PEL (754,000 µg/m^3), and below the ambient air concentration (10.2 µg/m^3). Toluene was the only VOC detected in the indoor air samples at the Tenneco facility. Benzene (7.9 µg/m^3), ethyl benzene (182 µg/m^3), toluene (48.4 µg/m^3), TCE (2,480 µg/m^3), m- and/or p-xylene (314 µg/m^3), and o-xylene (88.5 µg/m^3) were detected in all three sub-slab soil gas samples. PCE was detected in two sub-slab samples (4.4 and 61.6 µg/m^3), and chloroethane (3.4 µg/m^3), 1,1-DCA (681 µg/m^3), 1,2-DCA (187 µg/m^3), 1,1-DCE (7.6 µg/m^3), *cis*-1,2-DCE (1,270 µg/m^3), *trans*-1,2-DCE (29.4 µg/m^3), and 1,1,1-TCA (1,270 µg/m^3) were detected in one sub-slab sample. TCE and toluene were detected in all three exterior soil gas samples. The TCE concentrations ranged from 6.9 to 23.5 µg/m^3, and toluene concentrations ranged from 33.4 to 48.4 µg/m^3. Also, 1,1,1-TCA was detected in one exterior soil gas sample (3.9 µg/m^3), PCE was detected in one exterior sample (16.3 µg/m^3), and benzene was detected in one exterior sample (2.4 µg/m^3). Based on these results, the vapor exposure pathway is incomplete (i.e., vapors do not appear to be migrating from sub-slab soils to indoor air) at the Tenneco facility.

600 West Highway 30 Area

One exterior soil gas sample collected from this area contained PCE at 7.3 µg/m^3. No other chlorinated VOCs were detected in any other samples collected from this area.

Two indoor air samples were collected from an apartment building located east of the former Hunt Cleaners facility at 600 West Highway 30. Both samples contained detectable concentrations of toluene (13.4 and 10 µg/m^3), below its RSL (5,200 µg/m^3 for residential air) and near the level in ambient air. One sample also contained reportable concentrations of benzene (2.7 µg/m^3) and m- and/or p-xylene (5.1 µg/m^3). The benzene concentration exceeded its RSL for residential air (0.31 µg/m^3); however, the ambient air sample contained benzene at 2.2 µg/m^3. The m- and/or p-xylene concentration of 5.1 µg/m^3 did not exceed its RSL for residential air (730 µg/m^3), and was only slightly higher than the m- and/or p-xylene concentration in ambient air (4.4 µg/m^3). Therefore, these concentrations may not be the result of vapor intrusion. Ethyl benzene (3.6 and 6.2 µg/m^3), toluene (12 and 20.5 µg/m^3), m- and/or p-xylene (16.4 and 25.2 µg/m^3), and o-xylene (4.9 and 8.6 µg/m^3) were detected in both sub-slab soil gas samples collected at this location, and benzene was detected in one of the samples (2.7 µg/m^3). One exterior soil gas sample contained benzene at 1.8 µg/m^3 and toluene at 10.4 µg/m^3. Based on these results, the vapor exposure pathway appears incomplete, or only slightly impacting structures in this area.

710 Meridian Avenue Area

1,1,1-TCA was detected in the sole residential indoor air sample collected from this area (2.9 µg/m^3), below its RSL. The 1,1,1-TCA was from an unknown source, as the corresponding sub-slab and exterior soil gas samples did not contain reportable concentrations of 1,1,1-TCA. PCE (2,160 µg/m^3 and 125 µg/m^3) and TCE (10.5 µg/m^3 and 5.3 µg/m^3) were detected in the two exterior soil gas samples. Additional sampling may be warranted in the vicinity of a former dry cleaning facility (currently a thrift store) at this location, based on the PCE concentration of 2,160 µg/m^3 detected in an exterior soil gas sample collected southeast of that structure.

Benzene was detected at concentrations exceeding its RSLs (0.31 µg/m^3 for residential air, and 1.6 µg/m^3 for industrial air) in the two indoor air samples collected from this area (3.2 µg/m^3 at a residence, and 26.1 µg/m^3 at a workplace); however, these concentrations are both below its PEL (3,190 µg/m^3). The indoor air sample from the workplace also contained ethyl benzene (9.5 µg/m^3), exceeding its RSL (4.9 µg/m^3 for industrial air) but below its PEL (435,000 µg/m^3). Reportable concentrations of toluene (14.8 and 63.7 µg/m^3) and m- and/or p-xylene (5.2 and 32.5 µg/m^3) were also found in both samples, at levels below their respective RSLs and PELs. Toluene was detected in one of the exterior soil gas samples (1.9 µg/m^3). Benzene (1.9 µg/m^3), ethyl benzene (5.9 µg/m^3), toluene (23.1 µg/m^3), m- and/or p-xylene

(25.9 µg/m^3), and o-xylene (8.3 µg/m^3) were detected in one sub-slab soil gas sample. Because benzene, ethyl benzene, toluene, and m- and/or p-xylene were detected in both sub-slab soil gas and indoor air samples in the site vicinity, it appears intrusion of those compounds from soil gas vapors into overlying structures may be occurring. Access had not been granted to collect samples from the nearby thrift store (former dry cleaner) and adjacent buildings.

The benzene, toluene, ethyl benzene, and xylene (BTEX) contamination found at the 600 West Highway 30 and 710 Meridian Avenue areas is likely from petroleum sources. Response to petroleum-derived BTEX contamination is excluded from CERCLIS authority; therefore, further assessment regarding health impacts posed by the BTEX compounds may be referred to NDEQ.

7.0 REFERENCES

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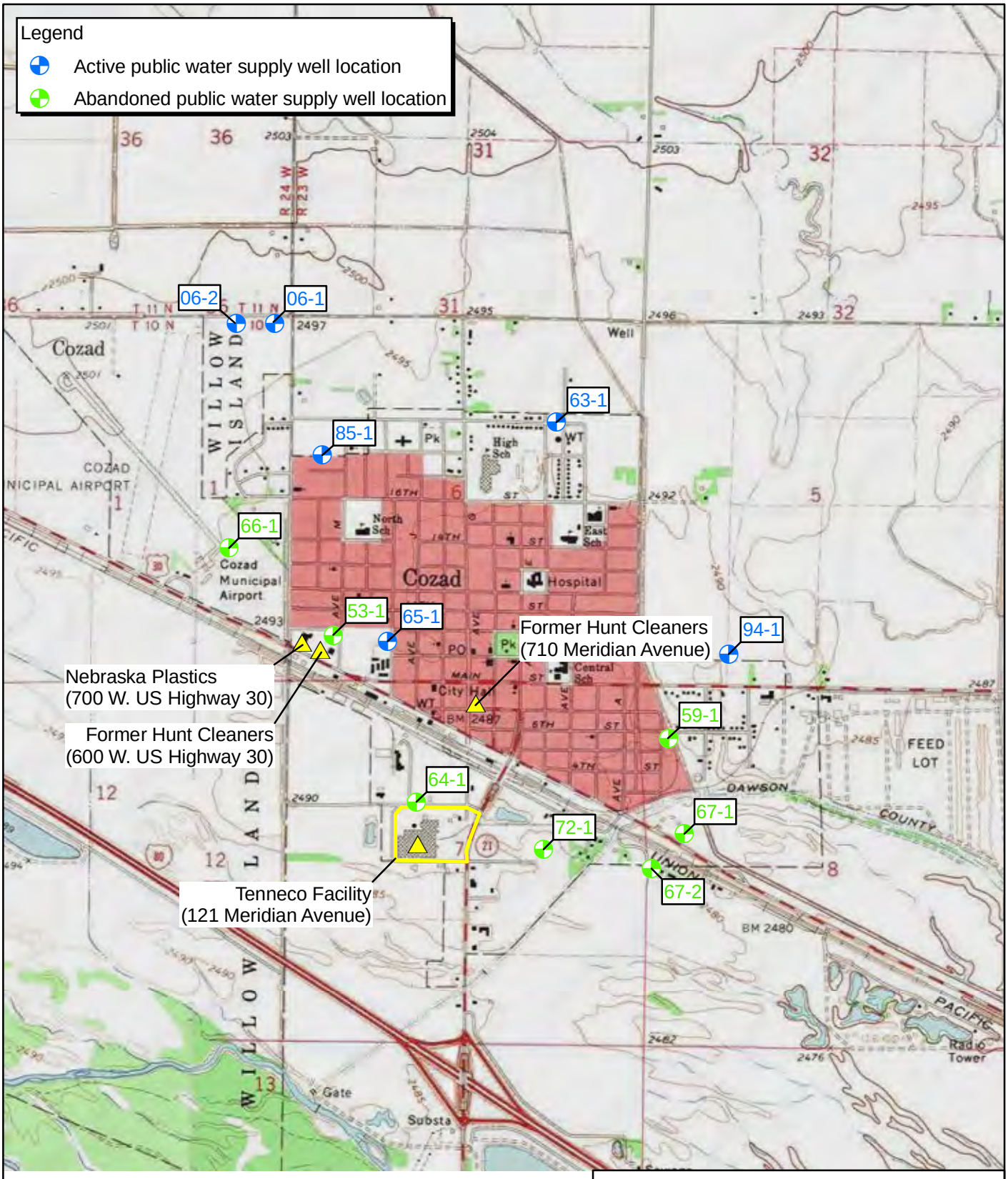
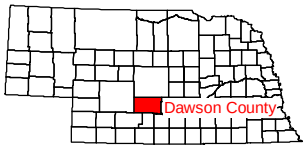
APPENDIX A

FIGURES





Source: USGS Cozad, NE 7.5 Minute Topo Quad, 1971
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USGS Willow Island, NE 7.5 Minute Topo Quad, 1970

N

0 1,000 2,000

Feet

Cozad Groundwater Site
Cozad, Nebraska

Figure 1
Source Areas and PWS Well Locations

TETRA TECH EM INC.

Date: 11/09/10 Drawn By: Gustavo Orozco Project No: X9004.L.06.002.059.001

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Legend

- Air sample location
- Exterior soil gas sample location
- Sub-slab sample location
- Major road
- Street

CAA Ambient air sample
CIA Indoor air sample
CSG Exterior soil gas sample
CSS Sub-slab sample

N

0 250 500 Feet

Source: GlobeXplorer Aerial Imagery, DigitalGlobe, 2009; HSIP Gold, 2007.

Cozad Groundwater Site
Cozad, Nebraska

Figure 2
Sample Locations

TETRA TECH EM INC.

Date: 03/01/11 Drawn By: Gustavo Orozco Project No: X9004.L.06.002.059.001

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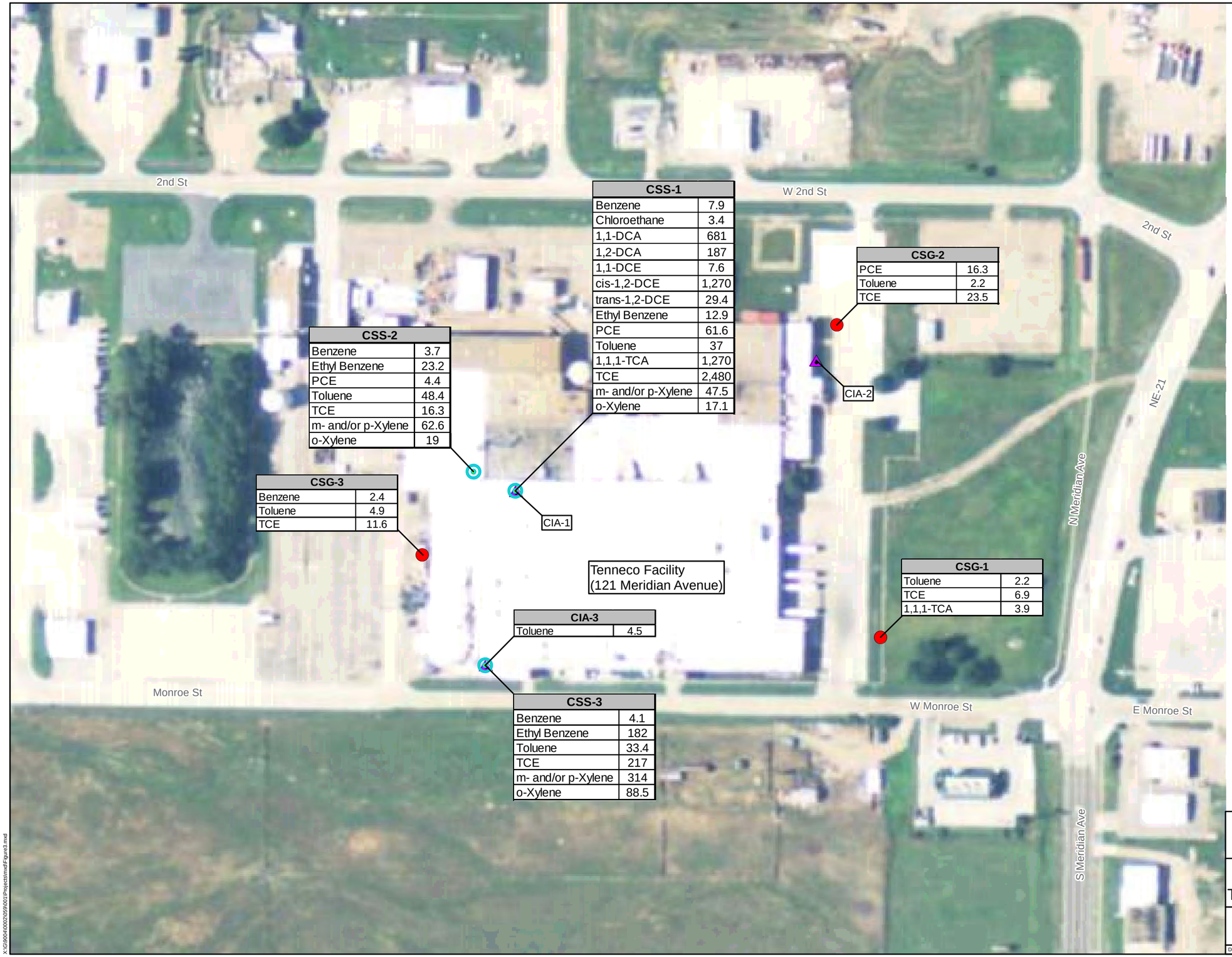

Legend

- Air sample location
- Exterior soil gas sample location
- Sub-slab sample location
- CIA Indoor air sample
- CSG Exterior soil gas sample
- CSS Sub-slab sample

Note: All results are in micrograms per cubic meter ($\mu g/m^3$)

N

0 75 150

Feet

Source: GlobeXplorer Aerial Imagery, DigitalGlobe, 2009; HSIP Gold, 2007.

Cozad Groundwater Site
Cozad, Nebraska

Figure 3
Tenneco Facitity Analytical Results Map

TETRA TECH EM INC.

Date: 03/01/11 Drawn By: Gustavo Orozco Project No: X9004.L.06.002.059.001

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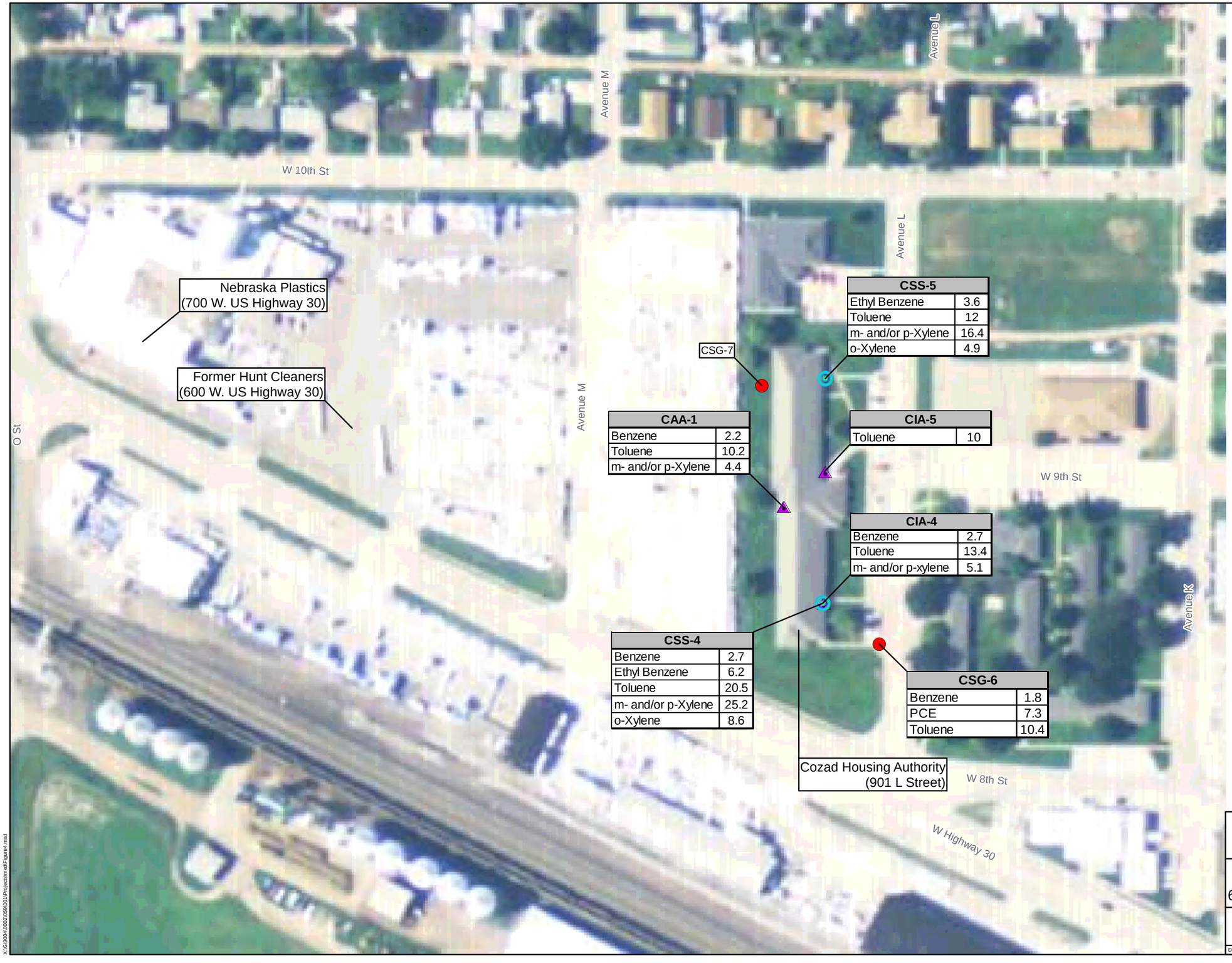

Legend

- Air sample location
- Exterior soil gas sample location
- Sub-slab sample location

CAA Ambient air sample
CIA Indoor air sample
CSG Exterior soil gas sample
CSS Sub-slab sample

Note: All results are in micrograms per cubic meter ($\mu g/m^3$)

N

0 60 120

Feet

Source: GlobeXplorer Aerial Imagery, DigitalGlobe, 2009; HSIP Gold, 2007.

Cozad Groundwater Site
Cozad, Nebraska

Figure 4

600 W Hwy 30 Area Analytical Results Map

TETRA TECH EM INC.

Date: 03/01/11 Drawn By: Gustavo Orozco Project No: X9004.L.06.002.059.001

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Legend

- Air sample location
- Exterior soil gas sample location
- Sub-slab sample location
- CIA Indoor air sample
- CSG Exterior soil gas sample
- CSS Sub-slab sample

Note: All results are in micrograms per cubic meter ($\mu g/m^3$)

N

0 50 100

Feet

Source: GlobeXplorer Aerial Imagery, DigitalGlobe, 2009; HSIP Gold, 2007.

Cozad Groundwater Site
Cozad, Nebraska

Figure 5
710 Meridian Avenue Area
Analytical Results Map

TETRA TECH EM INC.

Date: 03/24/11 Drawn By: Gustavo Orozco Project No: X9004.L.06.002.059.001

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APPENDIX B

PHOTOGRAPHIC LOG

Cozad Groundwater Site
Cozad, Nebraska

TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: North	DESCRIPTION	This photograph shows the location of exterior soil gas sample CSG-1.	1
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/7/11
	PHOTOGRAPHER	Laura Moore	

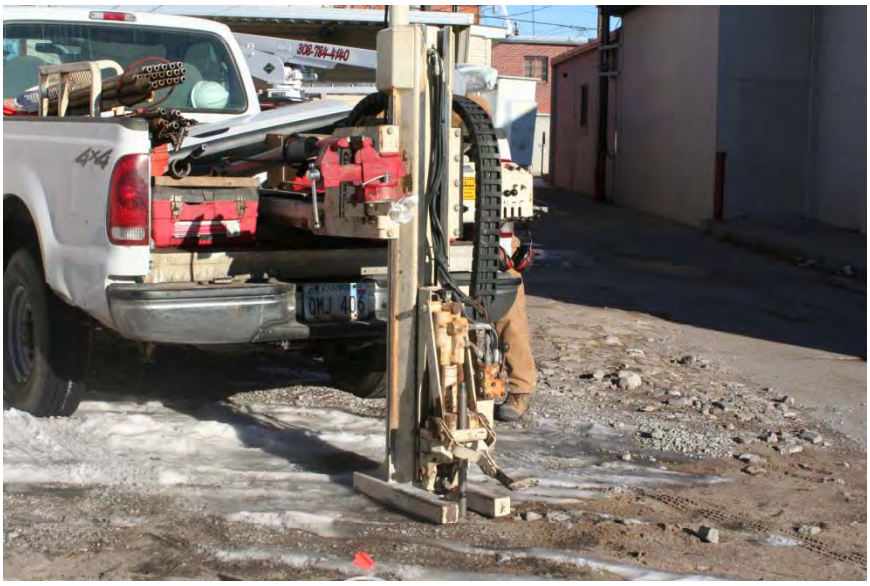
TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: Northwest	DESCRIPTION	This photograph shows the location of exterior soil gas sample CSG-1.	2
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/7/11
	PHOTOGRAPHER	Laura Moore	

Cozad Groundwater Site
Cozad, Nebraska

TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: North	DESCRIPTION	This photograph shows the location of exterior soil gas sample CSG-2.	3
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/7/11
	PHOTOGRAPHER	Laura Moore	

TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: Northwest	DESCRIPTION	This photograph shows the location of exterior soil gas sample CSG-3.	4
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/7/11
	PHOTOGRAPHER	Laura Moore	

Cozad Groundwater Site
Cozad, Nebraska



TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: North	DESCRIPTION	This photograph shows the location of exterior soil gas sample CSG-4.	5
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/7/11
	PHOTOGRAPHER	Laura Moore	

TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: South	DESCRIPTION	This photograph shows the location of exterior soil gas sample CSG-5.	6
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/7/11
	PHOTOGRAPHER	Laura Moore	

Cozad Groundwater Site
Cozad, Nebraska

TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: Southeast	DESCRIPTION	This photograph shows the location of exterior soil gas sample CSG-6.	7
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/7/11
	PHOTOGRAPHER	Laura Moore	

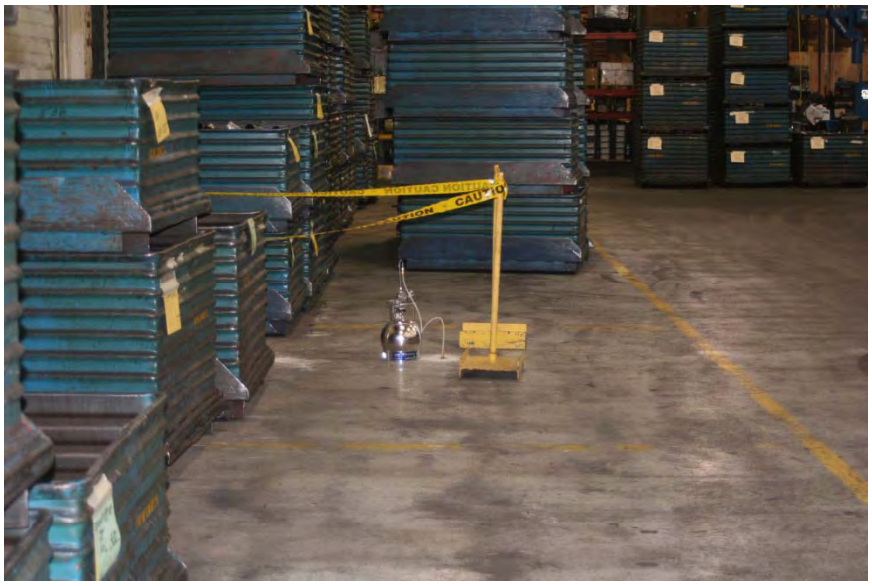
TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: South	DESCRIPTION	This photograph shows the location of exterior soil gas sample CSG-7.	8
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/7/11
	PHOTOGRAPHER	Laura Moore	

Cozad Groundwater Site
Cozad, Nebraska

TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: East	DESCRIPTION	This photograph shows the location of exterior soil gas sample CSG-8.	9
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/7/11
	PHOTOGRAPHER	Laura Moore	

TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: South	DESCRIPTION	This photograph shows the location of sub-slab soil gas sample CSS-1.	10
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/9/11
	PHOTOGRAPHER	Laura Moore	

Cozad Groundwater Site
Cozad, Nebraska



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	CLIENT	Environmental Protection Agency - Region 7	DATE 1/9/11
	PHOTOGRAPHER	Laura Moore	

TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: South	DESCRIPTION	This photograph shows the location of sub-slab soil gas sample CSS-3.	12
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/7/11
	PHOTOGRAPHER	Laura Moore	

Cozad Groundwater Site
Cozad, Nebraska

TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: Southwest	DESCRIPTION	This photograph shows the location of sub-slab soil gas sample CSS-4.	13
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/8/11
	PHOTOGRAPHER	Laura Moore	

TETRA TECH PROJECT NO. 9004.06.0002.059.001 DIRECTION: South	DESCRIPTION	This photograph shows the location of sub-slab soil gas sample CSS-5.	14
	CLIENT	Environmental Protection Agency - Region 7	DATE 1/8/11
	PHOTOGRAPHER	Laura Moore	

APPENDIX C

FIELD LOGBOOK

1/7/11 PARTLY CLOUDY, 25°, 10-15 MPH WIND
0800 STM ... GID & QD AT TENNECO LOCATION. MEET WITH UTILITIES + ROD KUSTMAN (TENNECO) UTILITIES COZAD TELEPHONE, SOURCE GAS, KINDER MORGAN, CITY OF COZAD QUAN TO START CSG-1
0840 AT 7TH + MERIDIAN TO CLEAR UTILITIES TOO MANY UTILITIES AT N LOCATION - WILL DO SUB-SLAB SAMPLE HERE. CHURCH WILL STILL NOT ALLOW ACCESS. WILL GO TO MEETING ON MONDAY AT 1930. OTHER LOCATIONS CLEARED
0900 AT 901 L ST. SOURCE GAS + ELECTRIC WILL MARK THEIR UTILITIES
0915 AT MEMORY PARK - LOCATION CLEARED
0935 AT TENNECO AFTER STOPPING AT COZAD TELEPHONE. MARIUS YOUNG NOT IN
0940 QUAN FINISHING CSG-2. COLLECTED AT 7' BGS START P 27"Hg END 10" Hg
0840 CSG-1 8' BGS START P 27"Hg END 10"Hg
0950 MOVE TO CSG-3
1000-1003 COLLECT CSG-3 START P 27"Hg END 8"Hg BH's BACKFILLED WITH BENTONITE. CSG-3 CAPPED WITH CONCRETE REPAIR

1/7/11
1020 AT 7TH + MERIDIAN
1022 START CSG-4
LATE ENTRY HIT H_2O AT 8' BGS AT CSG-2 COLLECT SAMPLE AT 6' BGS
CSG-3 COLLECTED AT 6' BGS
1025-1028 COLLECT CSG-4 6' BGS START 29" Hg END 8" Hg
LOCATED IN RIGHT OF WAY
1STCANNISTER DIDN'T HAVE PRESSURE
1040 BACKFILL BH WITH BENTONITE
1045 START CSG-5
1053-1054 COLLECT CSG-5 AT 6' BGS START 28" Hg END 8" Hg
BACKFILL BH WITH BENTONITE
THE LOCATION W OF THE THRIFT STORE HAS UTILITIES THROUGH OUT THE SIDE WALK AREA
1110 START CSG-6 901 L ST
1115-1116 COLLECT CSG-6 AT 6' BGS START 27" Hg END 9" Hg
BACKFILL BH WITH BENTONITE
1125 START CSG-7
1128-1129 COLLECT CSG-7 @ 6' BGS START 28" Hg END 8" Hg
BACKFILL BH WITH BENTONITE
UTILITIES, FENCE BLOCKING OTHER LOCATION

1/7/11

1139 START CSG-8 MUNY PARK BG LOCATION

1146-1147 COLLECT CSG-8 AT 6' BGS START 28" Hg END 8" Hg

1155 COLLECT 5193-109-FB - TRIP BLANK

BACKFILL CSG-8 WITH BENTONITE

1215 DEPART FOR LEXINGTON - LUNCH

1600 AT TENNECO

DEPARTMENT 13 UNDER TVBE WASHER - LOCATION FOR CSS-1

TCE TANK USED TO BE AT THIS LOCATION

1634 SET ROD FOR CSS-1

CSS 2 LOCATION IS NEAR DEPARTMENT 15 R-LINE STAGING IT IS NEAR WHERE PIPES WERE LOCATED THAT TRANSFERED TCE TO USTs - BETWEEN BEAM E20 + BEAM E21

1655 SET ROD FOR CSS-2

1700 CSS-3 LOCATION ANOTHER FORMER DEGREASER AREA IN DEPARTMENT 73 TOOL ROOM - ALONG OFFICE WALL NEAR BEAM M27

SET ROD FOR CSS-3

1718 CSG-1 40.85274 -99.98714

1/7/11

CSG-2 40.85408 -99.98730

CSG-3 40.8 -99

1730 AT 901 L AVE

Jerry + Joan Bennett #1

308-784-4994

ACCESS GRANTED TO MONITOR INDOOR AIR - ANYTIME EXCEPT RIGHT AFTER NOON

1800 DRILL + SET ROD IN GARBAGE ROOM S

1835 DRILL + SET ROD IN GARBAGE ROOM N

1850 DEPART FOR LEXINGTON

LM SPOKE WITH GORDON LINSTEDT ABOUT SAMPLING AT THE THRIFT STORE (PASTOR DOUG SMITH HAD DENIED ACCESS) MR LINSTEDT SAID NO DECISION HAD ~~HAD~~ WILL BE MADE UNTIL THE CHURCH BOARD MEETS MONDAY EVENING 1/10/11 (LM HAS BEEN CALLED THE CHURCH 11/5 12/10 NO ANSWER, 12/30/10 NO ANSWER, 1/4/11 DENIED)

LM SPOKE WITH DARREN (CODED TELEPHONE) WHEN I VISITED THE OFFICE, I HAD LEFT NUMEROUS MESSAGES WITH MARCUS YOUNG - NOT RETURNED + HE IS OUT OF THE OFFICE TODAY

1/8/11 OVERCAST, 25°, 5-10 MPH WIND
0730 DEPART FOR WALMART FOR SUPPLIES - STMs LM + GD
0805 ARRIVE AT DOT CENTER TO PICK UP SUPPLIES + GENERATOR
0823 DEPART FOR COZAD
0850 AT TENNECO
0855 ROD KOSTMAN ARRIVES
0920 START SETTING UP TO LEAK TEST CSS-1
0955 1075 ppm IN SHROUD. KEEPS GOING UP + 2400 ppm OPEN AIR. LEAK TEST INCONCLUSIVE
1001 START 29" Hg CSS-1
1106 AT CSS-2 ATTEMPTED TO GET DIELECTRIC RADIO DETECTION Helium/HYDROGEN MULTIGAS DETECTOR MGD-2002 TO RESPOND. UNSUCCESSFUL
1012 CSS-2 START 28" Hg
1020 CSS-3 START 25" Hg
CONCRETE IS CURED AT ALL LOCATIONS - NO VISIBLE CRACKS
1035 START C1A-1 CO LOCATED WITH CSS-1 28" Hg
1038 START C1A-3 31" Hg CO LOCATED WITH CSS-3
1045 START C1A-2 30" Hg
ASSEMBLY BUSINESS MNG OFFICE

1/8/11 =NOW
1105 AT 113 & 7TH ERVIN KLOPPENBORG
1127 SET ROD FOR ~~CSS~~ 7th 1/8/11 1:32 IN BASEMENT
1135 AT COZAD TELEPHONE DRILL NEAR LIGHT POLE 40.85855 -99.98522
1148 ROD SET AT COZAD TELEPHONE S OF BUILDING 40.85903 -99.98532
1207 SET ROD N OF COZAD TELEPHONE TO ACCESS WHETHER PEE TRAVELED N ALONG UTILITIES. ALLEY BETWEEN COZAD TELEPHONE + THRIFT STORE IS PRIVATELY OWNED WITH MANY UG UTILITIES RUNNING THROUGH IT - TEFLON TAPE IS BEING USED ON THE RODS INSTALLED OUT SIDE TO HELP ENSURE A BETTER SEAL
INSTALL ROD IN FRONT OF 706 MERIDIAN - THIS REPLACES SG-SAMPLE LOCATION - TOO MANY UTILITIES UNDER SIDE WALK FOR GEOPROBE HOLE
1221 DRILLED DOWN 1' STILL IN CONCRETE THERE WARE NO OTHER LOCATIONS THAT ARE SUITABLE

1/8/11

1230 DEPART FOR LEXINGTON

1335 LUNCH

1540 AT IVY PARK

1605 SET ROD BEHIND SOCCER CLUB
10.865'2 49C695

1610 DEPART FOR ~~COZAD~~ LEXINGTON

1802 AT 901 L AVE

1824 CSS-4 START 27" Hg
S GARBAGE ROOM

1825 C1A-4 START 26" Hg IN METER/PANEL ROOM - CRACKS IN FLOOR

1837 CSS-5 START 24" Hg IN N GARBAGE ROOM

1845 C1A-5 START 28" Hg IN ~~APT~~ 1

1853 AMBIENT AIR CAA1 29" Hg BACK (W SIDE) OF BLDG 901 L AVE

1857 DEPART FOR LEXINGTON

1920 AT LEXINGTON

1/9/11 SNOW

0740 DEPART FOR COZAD STMS
LM + GD

0802 ARRIVE AT TENNECO

0809 CSS-1 END 3" Hg

0809 C1A-1 END 3" Hg

0810 CSS-2 END 5" Hg

0811 CSS 3- END 7" Hg

C1A-3 ~~C1A-3 E~~ STILL AT 17" Hg

C1A-1 REG 151283 7333350

CSS-1 REG 129693 7276964

CSS-2 REG 128519 7273212

0845 CSS-1 + CSS-2 BACKFILLED WITH CEMENT

CSS-3 REG 126465 7266994

0942 C1A-2 END 7" Hg
REG 128691 7273191

1038 C1A-3 END 11" Hg
REG 128517 7273174

1125 ~~CSS-6~~ AT E KNOPPENBORG
113 E 7TH ST

1126 START CSS-6 28" Hg

1126 START C1A-6 28" Hg

1130 ~~AT~~ 901 L AVE

1129 CSS-5 END 4" Hg GARBAGE RM
REG 124899 7278813

1/9/11

HEAVY SNOW WE ARE STAYING IN COZAD UNTIL THE LAKE SAMPLES ARE READY SO WE DON'T HAVE TO COME BACK. ROADS ARE SNOW PACKED

CSS PATCHED

1200 LUNCH

1240 BACK AT LAKE.

1246 CAA-1 END 9" Hg

1251 CSS-4 END 10" Hg

1253 CIA-4 END 9" Hg

1257 CIA-5 END 9" Hg

CSS-4 PATCHED

1310 DEPART FOR LEXINGTON

[illegible] 1200 CP

1/10/11 SNOW, 10°, 10-15 MPH WIND

0856 ACCESS GRANTED FOR INDOOR AIR SAMPLING AT COZAD TELEPHONE

0900 TELEPHONED PJ JACOBSON - COZAD CITY PARKS & REC ABOUT PLACING THE AIR SAMMA CANNISTER INDOORS. THEY ARE TOO BUSY WITH SNOW REMOVAL

0915 DEPART FOR COZAD STM LM + GD

0955 AT E K

1000 CIA-6 END 3" Hg

CSS-6 still reading 14" Hg. Flow to Sampler full 24 hrs (1126)

1007 AT COZAD TELEPHONE

1009 CIA-7 START 28" Hg

1015 ROD IN FRONT OF COZAD TELEPHONE IS GONE

1019 ROD NE OF THRIFT STORE RUN OVER WITH PLOW

1035 ~~CSS-7~~ MUNY PARK

START ~~CSS-7~~ " Hg

END " Hg 846

NO SEAL

1050 CK AT JOHN WAGE ENTERPRISE 718 MERIDIAN AVE 69130 ACCESS DENIED

1100 ACKER OPTOMETRIST MERIDIAN AVE ACCESS DENIED

1/10/11

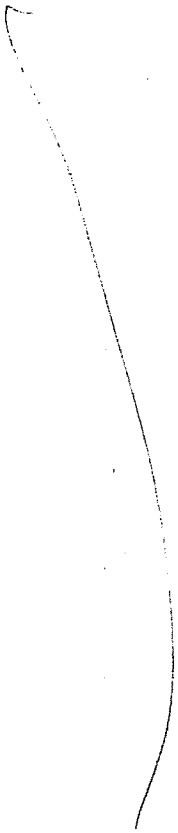
OTHER BUSINESSES ON THE BLOCK ARE CLOSED

1127 CSS-6 END 13" Hg

1136 CSS-6 BACKFILLED

1145 DEPART FOR LEXINGTON

Dawn Moore



1/11/11 -7° 10-15 MPH WIND CLEAR

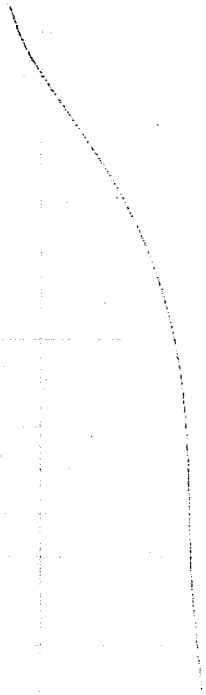
0800 DEPART FOR COZAD

0827 AT COZAD TELEPHONE

0830 SIA-7 END 5 "Hg

DEPART FOR LEXINGTON

Dawn Moore



APPENDIX D

FIELD SHEETS AND CHAIN-OF-CUSTODY RECORDS

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 5193 **Sample Number:** 101 **QC Code:** __ **Matrix:** Air **Tag ID:** 5193-101-__

Project ID: BMCNEGW **Project Manager:** Brian Mitchell
Project Desc: Cozad GW - Vapor Intrusion Assessment sampling
City: Cozad **State:** Nebraska
Program: Superfund
Site Name: Multi-Site - General **Site ID:** 07ZZ **Site OU:** 00

Location Desc: Source level air sample

External Sample Number: CSG-1

Expected Conc: (or Circle One: Low Medium High)

			Date	Time(24 hr)
Latitude:	40.85270	**Sample Collection: Start:**	08/07/11	08:40
Longitude:	99.98705	**End:**	1/7/11	08:43

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 400mL Canister	None	60 Days	1 VOCs in Air at Source Levels by GC/MS

Sample Comments:

(N/A)

TENNECO
121 MERIDIAN AVE
COZAD, NE

START # 27" Hg
END 10" Hg

Sample Collected By: LM/TT-START

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 5193 **Sample Number:** 102 **QC Code:** __ **Matrix:** Air **Tag ID:** 5193-102-__

Project ID: BMCNEGW **Project Manager:** Brian Mitchell
Project Desc: Cozad GW - Vapor Intrusion Assessment sampling
City: Cozad **State:** Nebraska
Program: Superfund
Site Name: Multi-Site - General **Site ID:** 07ZZ **Site OU:** 00

Location Desc: Source level air sample

External Sample Number: CSG-2

Expected Conc: (or Circle One: Low Medium High).

			Date	Time(24 hr)
Latitude:	40.85405	**Sample Collection: Start:**	1/7/11	09:40
Longitude:	99.98732	**End:**	1/7/11	09:43

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 400mL Canister	None	60 Days	1 VOCs In Air at Source Levels by GC/MS

Sample Comments:

(N/A) TENNECO
121 MERIDIAN AVE
COZAD, NE

P - START 27" Hg
END 10" Hg

Sample Collected By: LM/TT-START

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 5193 **Sample Number:** 103 **QC Code:** __ **Matrix:** Air **Tag ID:** 5193-103-__

Project ID: BMCNEGW **Project Manager:** Brian Mitchell
Project Desc: Cozad GW - Vapor Intrusion Assessment sampling
City: Cozad **State:** Nebraska
Program: Superfund
Site Name: Multi-Site - General **Site ID:** 07ZZ **Site OU:** 00

Location Desc: Source level air sample

External Sample Number: CSG-3

Expected Conc:	(or Circle One: Low Medium High)		**Date**	**Time(24 hr)**
Latitude: 40.85371		**Sample Collection: Start:**	1/7/11	10:00
Longitude: 99.98975		**End:**	1/7/11	10:03

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 400mL Canister	None	60 Days	1 VOCs in Air at Source Levels by GC/MS

Sample Comments:

(N/A)

TENNECO
121 MERIDIAN AVE
COZAD, NE

P START 27 "Hg
END 8 "Hg

Sample Collected By: LM/TT-START

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 5193 **Sample Number:** 104 **QC Code:** __ **Matrix:** Air **Tag ID:** 5193-104-__

Project ID: BMCNEGW **Project Manager:** Brian Mitchell
Project Desc: Cozad GW - Vapor Intrusion Assessment sampling
City: Cozad **State:** Nebraska
Program: Superfund
Site Name: Multi-Site - General **Site ID:** 07ZZ **Site OU:** 00

Location Desc: Source level air sample

External Sample Number: CSG-4

			Date	Time(24 hr)
Expected Conc:	(or Circle One: Low Medium High)			
Latitude:	40.85857	**Sample Collection: Start:**	1/7/11	10:25
Longitude:	99.98536	**End:**	1/7/11	10:28

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 400mL Canister	None	60 Days	1 VOCs in Air at Source Levels by GC/MS

Sample Comments:
(N/A) CITY RIGHT OF WAY

START 28 "Hg
END 8 "Hg

Sample Collected By: LM/TT-START

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 5193 **Sample Number:** 105 **QC Code:** __ **Matrix:** Air **Tag ID:** 5193-105-__

Project ID: BMCNEGW **Project Manager:** Brian Mitchell
Project Desc: Cozad GW - Vapor Intrusion Assessment sampling
City: Cozad **State:** Nebraska
Program: Superfund
Site Name: Multi-Site - General **Site ID:** 07ZZ **Site OU:** 00

Location Desc: Source level air sample

External Sample Number: CSG-5

Expected Conc:	(or Circle One: Low Medium High)	**Date**	**Time(24 hr)**
Latitude: 40.85845	**Sample Collection: Start:**	1/7/11	10:53
Longitude: 99.98534	**End:**	1/7/11	10:54

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 400mL Canister	None	60 Days	1 VOCs in Air at Source Levels by GC/MS

Sample Comments: CITY RIGHT OF WAY
(N/A)
START 28 "Hg
END 8 "Hg

Sample Collected By: LM/TT-START

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 5193 **Sample Number:** 106 **QC Code:** __ **Matrix:** Air **Tag ID:** 5193-106-__

Project ID: BMCNEGW **Project Manager:** Brian Mitchell
Project Desc: Cozad GW - Vapor Intrusion Assessment sampling
City: Cozad **State:** Nebraska
Program: Superfund
Site Name: Multi-Site - General **Site ID:** 07ZZ **Site OU:** 00

Location Desc: Source level air sample

External Sample Number: CSG-6

Expected Conc: (or Circle One: Low Medium High)

			Date	Time(24 hr)
Latitude:	46.86603	**Sample Collection: Start:**	1/7/11	11:15
Longitude:	99.99139	**End:**	1/7/11	11:16

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 400mL Canister	None	60 Days	1 VOCs in Air at Source Levels by GC/MS

Sample Comments:
(N/A)

Start 27 " Hg
End 9 " Hg

COZAD HOUSING AUTHORITY
PAT HOBICK
901 L ST
LEXINGTON, NE

Sample Collected By: LM/TT-START

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 5193 **Sample Number:** 107 **QC Code:** __ **Matrix:** Air **Tag ID:** 5193-107-__

Project ID: BMCNEGW **Project Manager:** Brian Mitchell
Project Desc: Cozad GW - Vapor Intrusion Assessment sampling
City: Cozad **State:** Nebraska
Program: Superfund
Site Name: Multi-Site - General **Site ID:** 07ZZ **Site OU:** 00

Location Desc: Source level air sample

External Sample Number: CSG-7

			Date	Time(24 hr)
Expected Conc:	(or Circle One: Low Medium High)			
Latitude: 40.86092		**Sample Collection: Start:**	1/7/11	11:28
Longitude: 99.99194		**End:**	1/7/11	11:29

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 400mL Canister	None	60 Days	1 VOCs in Air at Source Levels by GC/MS

Sample Comments:
(N/A)

START 27" Hg
END 8" Hg

COZAD HOUSING AUTHORITY
PAT HOBICK
901 L ST
LEXINGTON, NE

Sample Collected By: LM/TT-START

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 5193 **Sample Number:** 108 **QC Code:** __ **Matrix:** Air **Tag ID:** 5193-108-__

Project ID: BMCNEGW **Project Manager:** Brian Mitchell
Project Desc: Cozad GW - Vapor Intrusion Assessment sampling
City: Cozad **State:** Nebraska
Program: Superfund
Site Name: Multi-Site - General **Site ID:** 07ZZ **Site OU:** 00

Location Desc: Source level air sample

External Sample Number: CSG-8

			Date	Time(24 hr)
Expected Conc:	(or Circle One: Low Medium High)			
Latitude: 40.80545		**Sample Collection: Start:**	1/7/11	11:46
Longitude: 99.99591		**End:**	1/7/11	11:47

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 400mL Canister	None	60 Days	1 VOCs in Air at Source Levels by GC/MS

Sample Comments:
(N/A)

MUNY PARK
CITY OF COZAD

START 28 "Hg
END 8 "Hg

Sample Collected By: LM/TT-START

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 5193 **Sample Number:** 109 **QC Code:** __ **Matrix:** Air **Tag ID:** 5193-109-FB

Project ID: BMCNEGW **Project Manager:** Brian Mitchell
Project Desc: Cozad GW - Vapor Intrusion Assessment sampling
City: Cozad **State:** Nebraska
Program: Superfund
Site Name: Multi-Site - General **Site ID:** 07ZZ **Site OU:** 00

Location Desc: Source level air sample

External Sample Number: _____

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 1/7/11 11:55
Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 400mL Canister	None	60 Days	1 VOCs in Air at Source Levels by GC/MS

Sample Comments:

(N/A)

Sample Collected By: LM/TT-START

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
BRIAN MITCHELL	GOZAD GW VIA	7 / 1 / 11	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: SUMMA CANISTER (CUBITAINER)	BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	SAMPLED MEDIA: water	soil	sediment	dust	other: AIR	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
5193-101	1									X	
5193-102	1									X	
5193-103	1									X	
5193-104	1									X	
5193-105	1									X	
5193-106	1									X	
5193-107	1									X	
5193-108	1									X	
5193-109FB	1									X	

ASH NOT COMPLETE

DESCRIPTION OF SHIPMENT

_____ PIECE(S) CONSISTING OF _____ BOX(ES)

_____ ICE CHEST(S); OTHER _____

MODE OF SHIPMENT

_____ COMMERCIAL CARRIER: _____

_____ COURIER

_____ SAMPLER CONVEYED (SHIPPING DOCUMENT NUMBER) _____

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
Brian Mo ☐ SEALED ☒ UNSEALED	1/10/11	11:30	RDWiggam ☐ SEALED ☒ UNSEALED	Rec'd at Lab
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY

7-EPA-9262(Revised 5/85)

APPENDIX E

ANALYTICAL RESULTS

United States Environmental Protection Agency
Region 7
901 N. 5th Street
Kansas City, KS 66101

Date: 02/04/2011

Subject: Transmittal of Sample Analysis Results for ASR #: 5193

Project ID: BMCNEGW

Project Description: Cozad GW - Vapor Intrusion Assessment sampling

From: Michael F. Davis, Chief
Chemical Analysis and Response Branch, Environmental Services Division

To: Brian Mitchell
SUPR/ERNB

Enclosed are the analytical data for the above-referenced Analytical Services Request (ASR) and Project. The Regional Laboratory has reviewed and verified the results in accordance with procedures described in our Quality Manual (QM). In addition to all of the analytical results, this transmittal contains pertinent information that may have influenced the reported results and documents any deviations from the established requirements of the QM.

Please contact us within 14 days of receipt of this package if you determine there is a need for any changes. Please complete the enclosed Customer Satisfaction Survey and Data Disposition/Sample Release memo for this ASR as soon as possible. The process of disposing of the samples for this ASR will be initiated 30 days from the date of this transmittal unless an alternate release date is specified on the Data Disposition/Sample Release memo.

If you have any questions or concerns relating to this data package, contact our customer service line at 913-551-5295.

Enclosures

cc: Analytical Data File.

Project Manager: Brian Mitchell Org: SUPR/ERNB Phone: 913-551-7633
Project ID: BMCNEGW
Project Desc: Cozad GW - Vapor Intrusion Assessment sampling
Location: Cozad State: Nebraska Program: Superfund
Site Name: Multi-Site - General Site ID: 07ZZ Site OU: 00
Purpose: Site Preliminary Assessment GPRA PRC: 302DD2C
CERCLIS ID: NEN000705851.

Explanation of Codes, Units and Qualifiers used on this report

Sample QC Codes: QC Codes identify the type of sample for quality control purpose.

__ = Field Sample
FB = Field Blank

Units: Specific units in which results are reported.

ug/m3 = Micrograms per Cubic Meter

Data Qualifiers: Specific codes used in conjunction with data values to provide additional information on the quality of reported results, or used to explain the absence of a specific value.

(Blank) = Values have been reviewed and found acceptable for use.
U = The analyte was not detected at or above the reporting limit.

Project ID: BMCNEGW Project Desc: Cozad GW - Vapor Intrusion Assessment sampling

Sample No	QC Code	Matrix	Location Description	External Sample No	Start Date	Start Time	End Date	End Time	Receipt Date
1	__	Air	CIA-1		01/08/2011	10:35	01/09/2011	08:09	01/12/2011
2	__	Air	CIA-2		01/08/2011	10:45	01/09/2011	09:42	01/12/2011
3	__	Air	CIA-3		01/08/2011	10:38	01/09/2011	10:38	01/12/2011
4	__	Air	CIA-4		01/08/2011	18:25	01/09/2011	12:53	01/12/2011
5	__	Air	CIA-5		01/08/2011	18:45	01/09/2011	12:57	01/12/2011
6	__	Air	CAA-1		01/08/2011	18:53	01/09/2011	12:46	01/12/2011
7	__	Air	CIA-6		01/09/2011	11:26	01/10/2011	10:00	01/12/2011
8	__	Air	CIA-7		01/10/2011	10:09	01/11/2011	08:30	01/12/2011
101	__	Air	CSG-1		01/07/2011	08:40	01/07/2011	08:43	01/12/2011
102	__	Air	CSG-2		01/07/2011	09:40	01/07/2011	09:43	01/12/2011
103	__	Air	CGS-3		01/07/2011	10:00	01/07/2011	10:03	01/12/2011
104	__	Air	CSG-4		01/07/2011	10:25	01/07/2011	10:28	01/12/2011
105	__	Air	CSG-5		01/07/2011	10:53	01/07/2011	10:54	01/12/2011
106	__	Air	CSG-6		01/07/2011	11:15	01/07/2011	11:16	01/12/2011
107	__	Air	CSG-7		01/07/2011	11:28	01/07/2011	11:29	01/12/2011
108	__	Air	CSG-8		01/07/2011	11:46	01/07/2011	11:47	01/12/2011
109	FB	Air	Source level air sample - Field Blank		01/07/2011	11:55			01/12/2011
110	__	Air	CSS-1		01/08/2011	10:01	01/09/2011	08:09	01/12/2011
111	__	Air	CSS-2		01/08/2011	10:12	01/09/2011	08:10	01/12/2011
112	__	Air	CSS-3		01/08/2011	10:20	01/09/2011	08:14	01/12/2011
113	__	Air	CSS-4		01/08/2011	18:24	01/09/2011	12:51	01/12/2011
114	__	Air	CSS-5		01/08/2011	18:37	01/09/2011	12:57	01/12/2011
115	__	Air	CSS-6		01/09/2011	11:26	01/10/2011	11:27	01/12/2011

Analysis	Comments About Results For This Analysis

1 VOCs in Air at Ambient Levels by GC/MS

Lab: RASP Contract Lab (Out-Source)

Method: Similar to EPA Region 7 RLAB Method 3230.4E (see comments)

Samples:							
	1-__	2-__	3-__	4-__	5-__	6-__	7-__
	8-__	101-__	102-__	103-__	104-__	105-__	106-__
	107-__	108-__	109-FB	110-__	111-__	112-__	113-__
	114-__	115-__					

Comments:

Some samples were originally designated as ambient level while others were designated as source level samples. The laboratory analyzed all samples as ambient level.

The pressure of the sample canisters were checked prior to analysis. The pressures ranged from 8.1 to 14.4 psia. Sample 5193-109FB was received under vacuum and was pressurized to 12.5 psia for analysis.

Dilutions were performed due to target analyte concentrations on samples 5193-104; 5193-110; & 5193-112.

Analysis/ Analyte	Units	1-__	2-__	3-__	4-__
1 VOCs in Air at Ambient Levels by GC/MS					
Benzene	ug/m3	1.6 U	1.6 U	1.6 U	2.7
Carbon Tetrachloride	ug/m3	3.1 U	3.1 U	3.1 U	3.1 U
Chloroethane	ug/m3	1.3 U	1.3 U	1.3 U	1.3 U
Chloromethane	ug/m3	1 U	1 U	1 U	1 U
1,1-Dichloroethane	ug/m3	2 U	2 U	2 U	2 U
1,2-Dichloroethane	ug/m3	2 U	2 U	2 U	2 U
1,1-Dichloroethene	ug/m3	2 U	2 U	2 U	2 U
cis-1,2-Dichloroethene	ug/m3	2 U	2 U	2 U	2 U
trans-1,2-Dichloroethene	ug/m3	2 U	2 U	2 U	2 U
Ethyl Benzene	ug/m3	2.2 U	2.2 U	2.2 U	2.2 U
1,1,2,2-Tetrachloroethane	ug/m3	3.4 U	3.4 U	3.4 U	3.4 U
Tetrachloroethene	ug/m3	3.4 U	3.4 U	3.4 U	3.4 U
Toluene	ug/m3	1.9 U	1.9 U	4.5	13.4
1,1,1-Trichloroethane	ug/m3	2.7 U	2.7 U	2.7 U	2.7 U
1,1,2-Trichloroethane	ug/m3	2.7 U	2.7 U	2.7 U	2.7 U
Trichloroethene	ug/m3	2.7 U	2.7 U	2.7 U	2.7 U
Vinyl Chloride	ug/m3	1.3 U	1.3 U	1.3 U	1.3 U
m and/or p-Xylene	ug/m3	4.3 U	4.3 U	4.3 U	5.1
o-Xylene	ug/m3	2.2 U	2.2 U	2.2 U	2.2 U

Analysis/ Analyte	Units	5-__	6-__	7-__	8-__
1 VOCs in Air at Ambient Levels by GC/MS					
Benzene	ug/m3	1.6 U	2.2	3.2	26.1
Carbon Tetrachloride	ug/m3	3.1 U	3.1 U	3.1 U	3.1 U
Chloroethane	ug/m3	1.3 U	1.3 U	1.3 U	1.3 U
Chloromethane	ug/m3	1 U	1 U	1 U	1 U
1,1-Dichloroethane	ug/m3	2 U	2 U	2 U	2 U
1,2-Dichloroethane	ug/m3	2 U	2 U	2 U	2 U
1,1-Dichloroethene	ug/m3	2 U	2 U	2 U	2 U
cis-1,2-Dichloroethene	ug/m3	2 U	2 U	2 U	2 U
trans-1,2-Dichloroethene	ug/m3	2 U	2 U	2 U	2 U
Ethyl Benzene	ug/m3	2.2 U	2.2 U	2.2 U	9.5
1,1,2,2-Tetrachloroethane	ug/m3	3.4 U	3.4 U	3.4 U	3.4 U
Tetrachloroethene	ug/m3	3.4 U	3.4 U	3.4 U	3.4 U
Toluene	ug/m3	10	10.2	14.8	63.7
1,1,1-Trichloroethane	ug/m3	2.7 U	2.7 U	2.9	2.7 U
1,1,2-Trichloroethane	ug/m3	2.7 U	2.7 U	2.7 U	2.7 U
Trichloroethene	ug/m3	2.7 U	2.7 U	2.7 U	2.7 U
Vinyl Chloride	ug/m3	1.3 U	1.3 U	1.3 U	1.3 U
m and/or p-Xylene	ug/m3	4.3 U	4.4	5.2	32.5
o-Xylene	ug/m3	2.2 U	2.2 U	2.2 U	10.9

Analysis/ Analyte	Units	101-__	102-__	103-__	104-__
1 VOCs in Air at Ambient Levels by GC/MS					
Benzene	ug/m3	1.6 U	1.6 U	2.4	1.6 U
Carbon Tetrachloride	ug/m3	3.1 U	3.1 U	3.1 U	3.1 U
Chloroethane	ug/m3	1.3 U	1.3 U	1.3 U	1.3 U
Chloromethane	ug/m3	1 U	1 U	1 U	1 U
1,1-Dichloroethane	ug/m3	2 U	2 U	2 U	2 U
1,2-Dichloroethane	ug/m3	2 U	2 U	2 U	2 U
1,1-Dichloroethene	ug/m3	2 U	2 U	2 U	2 U
cis-1,2-Dichloroethene	ug/m3	2 U	2 U	2 U	2 U
trans-1,2-Dichloroethene	ug/m3	2 U	2 U	2 U	2 U
Ethyl Benzene	ug/m3	2.2 U	2.2 U	2.2 U	2.2 U
1,1,2,2-Tetrachloroethane	ug/m3	3.4 U	3.4 U	3.4 U	3.4 U
Tetrachloroethene	ug/m3	3.4 U	16.3	3.4 U	2160
Toluene	ug/m3	2.2	2.2	4.9	1.9 U
1,1,1-Trichloroethane	ug/m3	3.9	2.7 U	2.7 U	2.7 U
1,1,2-Trichloroethane	ug/m3	2.7 U	2.7 U	2.7 U	2.7 U
Trichloroethene	ug/m3	6.9	23.5	11.6	10.5
Vinyl Chloride	ug/m3	1.3 U	1.3 U	1.3 U	1.3 U
m and/or p-Xylene	ug/m3	4.3 U	4.3 U	4.3 U	4.3 U
o-Xylene	ug/m3	2.2 U	2.2 U	2.2 U	2.2 U

Analysis/ Analyte	Units	105-__	106-__	107-__	108-__
1 VOCs in Air at Ambient Levels by GC/MS					
Benzene	ug/m3	1.6 U	1.8	1.6 U	1.6 U
Carbon Tetrachloride	ug/m3	3.1 U	3.1 U	3.1 U	3.1 U
Chloroethane	ug/m3	1.3 U	1.3 U	1.3 U	1.3 U
Chloromethane	ug/m3	1 U	1 U	1 U	1 U
1,1-Dichloroethane	ug/m3	2 U	2 U	2 U	2 U
1,2-Dichloroethane	ug/m3	2 U	2 U	2 U	2 U
1,1-Dichloroethene	ug/m3	2 U	2 U	2 U	2 U
cis-1,2-Dichloroethene	ug/m3	2 U	2 U	2 U	2 U
trans-1,2-Dichloroethene	ug/m3	2 U	2 U	2 U	2 U
Ethyl Benzene	ug/m3	2.2 U	2.2 U	2.2 U	2.2 U
1,1,2,2-Tetrachloroethane	ug/m3	3.4 U	3.4 U	3.4 U	3.4 U
Tetrachloroethene	ug/m3	125	7.3	3.4 U	3.4 U
Toluene	ug/m3	1.9	10.4	1.9 U	1.9 U
1,1,1-Trichloroethane	ug/m3	2.7 U	2.7 U	2.7 U	2.7 U
1,1,2-Trichloroethane	ug/m3	2.7 U	2.7 U	2.7 U	2.7 U
Trichloroethene	ug/m3	5.3	2.7 U	2.7 U	2.7 U
Vinyl Chloride	ug/m3	1.3 U	1.3 U	1.3 U	1.3 U
m and/or p-Xylene	ug/m3	4.3 U	4.3 U	4.3 U	4.3 U
o-Xylene	ug/m3	2.2 U	2.2 U	2.2 U	2.2 U

Analysis/ Analyte	Units	109-FB	110-__	111-__	112-__
1 VOCs in Air at Ambient Levels by GC/MS					
Benzene	ug/m3	1.6 U	7.9	3.7	4.1
Carbon Tetrachloride	ug/m3	3.1 U	3.1 U	3.1 U	3.1 U
Chloroethane	ug/m3	1.3 U	3.4	1.3 U	1.3 U
Chloromethane	ug/m3	1 U	1 U	1 U	1 U
1,1-Dichloroethane	ug/m3	2 U	681	2 U	2 U
1,2-Dichloroethane	ug/m3	2 U	187	2 U	2 U
1,1-Dichloroethene	ug/m3	2 U	7.6	2 U	2 U
cis-1,2-Dichloroethene	ug/m3	2 U	1270	2 U	2.4
trans-1,2-Dichloroethene	ug/m3	2 U	29.4	2 U	2 U
Ethyl Benzene	ug/m3	2.2 U	12.9	23.2	182
1,1,2,2-Tetrachloroethane	ug/m3	3.4 U	3.4 U	3.4 U	3.4 U
Tetrachloroethene	ug/m3	3.4 U	61.6	4.4	3.4 U
Toluene	ug/m3	1.9 U	37	48.4	33.4
1,1,1-Trichloroethane	ug/m3	2.7 U	1270	2.7 U	2.7 U
1,1,2-Trichloroethane	ug/m3	2.7 U	2.7 U	2.7 U	2.7 U
Trichloroethene	ug/m3	2.7 U	2480	16.3	217
Vinyl Chloride	ug/m3	1.3 U	1.3 U	1.3 U	1.3 U
m and/or p-Xylene	ug/m3	4.3 U	47.5	62.6	314
o-Xylene	ug/m3	2.2 U	17.1	19	88.5

Analysis/ Analyte	Units	113-__	114-__	115-__
1 VOCs in Air at Ambient Levels by GC/MS				
Benzene	ug/m3	2.7	1.6 U	1.9
Carbon Tetrachloride	ug/m3	3.1 U	3.1 U	3.1 U
Chloroethane	ug/m3	1.3 U	1.3 U	1.3 U
Chloromethane	ug/m3	1 U	1 U	1 U
1,1-Dichloroethane	ug/m3	2 U	2 U	2 U
1,2-Dichloroethane	ug/m3	2 U	2 U	2 U
1,1-Dichloroethene	ug/m3	2 U	2 U	2 U
cis-1,2-Dichloroethene	ug/m3	2 U	2 U	2 U
trans-1,2-Dichloroethene	ug/m3	2 U	2 U	2 U
Ethyl Benzene	ug/m3	6.2	3.6	5.9
1,1,2,2-Tetrachloroethane	ug/m3	3.4 U	3.4 U	3.4 U
Tetrachloroethene	ug/m3	3.4 U	3.4 U	3.4 U
Toluene	ug/m3	20.5	12	23.1
1,1,1-Trichloroethane	ug/m3	2.7 U	2.7 U	2.7 U
1,1,2-Trichloroethane	ug/m3	2.7 U	2.7 U	2.7 U
Trichloroethene	ug/m3	2.7 U	2.7 U	2.7 U
Vinyl Chloride	ug/m3	1.3 U	1.3 U	1.3 U
m and/or p-Xylene	ug/m3	25.2	16.4	25.9
o-Xylene	ug/m3	8.6	4.9	8.3